Chapter 23 Head, Facial, & Neck Trauma

Introduction to Head, Facial, & Neck Injuries
- Common major trauma
- 4 million people experience head trauma annually
  - Severe __________________________ injury is most frequent cause of trauma death
  - __________________________________________ to cranium: 75-80% mortality
- Most At Risk population
  - Males 15-24
  - Infants and young children
  - __________________________________________

TIME IS CRITICAL!!
- Intracranial __________________________
- Progressing Edema
  - Increased __________________________
  - Cerebral Hypoxia
  - Permanent Damage
- Severity is difficult to recognize
  - __________________________ signs may be first indication
  - __________________________ diagnosis improves survivability

Anatomy Review
Scalp
- Strong, flexible mass of:
  - Skin
  - Fascia
  - __________________________ tissue
- Highly __________________________
  - __________________________ provides insulation

The Skull
- Facial bones
- Cranium
  - __________________________ for the brain
  - Strong, light, rigid, spherical bone
  - Unyielding to increased __________________________ pressure
  - Bones: Frontal, Parietal, __________________________, Temporal, Ethmoid, Sphenoid

Cranium

Meninges (1 of 2)
- Protective mechanism for the CNS
  - __________________________ mater
- Provides continuous connective tissue
- Large __________________________ above that provide blood flow to the surface of the brain mater
- Covers all areas of brain and spinal cord
- Very vascular

9  Meninges (2 of 2)
- __________________________ membrane
- Suspends brain in cranial cavity
  - Collagen and elastin fibers
- Subarachnoid space beneath
  - __________________________
  - Cushions __________________________

10  The Meninges and Skull

11  Cerebrospinal Fluid
- Clear, colorless fluid
- Composed of:
  - Water
  - Protein
  - __________________________
- Cushions CNS
- Made in largest two __________________________ of brain
- Medium for __________________________ and waste products to diffuse into and out of brain

12  The Brain
- Occupies _______% of cranium
- Composed of three major structures
  - Cerebrum, Cerebellum, and Brainstem
- High metabolic rate
  - Receives _______ % of cardiac output
  - Consumes _______ % of body’s oxygen
  - Requires constant circulation
- IF blood supply stops:
  - Unconscious within _______ seconds
  - Death in _______ – _______ minutes

13  Cerebrum (1 of 2)
- Center of conscious thought, personality, __________________________, and motor control
- Visual, auditory, and tactile perception
- Frontal Lobe
  - __________________________
- Parietal Lobe
- Motor and __________________________ activity
- Memory and emotion

14  Cerebrum (2 of 2)
- Occipital Lobe
  - __________________________
- Temporal Lobe
  - __________________________-term memory
  - __________________________, speech, taste, and smell

15  Hemispheres of Cerebrum
- Left: DOMINANT
  - Mathematical computations: occipital
  - Writing: __________________________
  - Language interpretation: __________________________
  - Speech: frontal
- Right: NON-DOMINANT
  - Non-verbal __________________________

16  Cerebellum
- “Fine tunes” __________________________ control
- Allows smooth movement
- Maintains __________________________
- Maintains __________________________ tone

17  Brain Stem
- Central processing center
- Communication junction among:
  - __________________________
    - Spinal cord
    - Cranial nerves
  - __________________________
- Structures
  - Midbrain
  - Pons
  - Medulla __________________________

18  Midbrain
- __________________________ portion of brainstem
- Hypothalamus
  - Endocrine function, __________________________ reflex, hunger, thirst
  - Kidney function, body temperature, emotion
- Thalamus
  - ESTABLISHES __________________________
    - Major pathways for optic and olfactory nerves

19  Pons
● Communication interchange between the cerebellum, cerebrum, midbrain, and spinal cord
● Bulb-shaped structure above the ____________________________________

20 Medulla Oblongata
● Bulge in the top of the spinal cord
● Centers
  – __________________________ center
    ● Controls depth, rate, and rhythm
  – __________________________ center
    ● Regulates rate and strength of cardiac contractions
  – __________________________ center
    ● Distribution of blood
    ● Maintains blood pressure

21 Structures of the Neck
● __________________________ arteries
● __________________________ veins
● Esophagus
● Trachea
● Larynx
  – Thyroid and cricoid cartilage

22 Mechanisms of Injury
  Blunt Injury:
  ● Motor vehicle collisions
  ● Falls
  Penetrating Injury:
  ● __________________________ wounds
  ● Stabbing
  ● __________________________

23 Scalp Injury
● __________________________
● Lacerations
● Avulsions
● Significant Hemorrhage
  – Scalp is __________________________ in blood vessels
  ALWAYS Reconsider __________________________ for severe underlying problems

24 Scalp Injury

25 Cranial Injury
● Trauma must be extreme to fracture
- Depressed
- Open
- Impaled Object

● Basal Skull
- Unprotected
- Spaces ______________________ structure
- Relatively easier to ______________________

26 Skull Fractures

27 Basal Skull Fracture Signs

● Battle's Signs
  - ______________________ Ecchymosis
  - Associated with fracture of auditory canal and lower areas of skull

● Raccoon Eyes
  - Bilateral ______________________ Ecchymosis
  - Associated with orbital fractures

28 Basal Skull Fracture

29 Raccoon Eyes

30 Battle’s Sign

31 Basal Skull Fracture

● May tear ______________________
● Permit ______________________ to drain through an external passageway
● May mediate rise of ICP
● Evaluate for “Target” or “________________________” sign

32 Halo Sign

33 Brain Injury

● As defined by the National Head Injury Foundation:
  - Brain Injury is “a ______________________ insult to the brain capable of producing physical, intellectual, emotional, social and vocational changes.”

● Classifications:
  - ______________________ : Primary injury caused by forces of trauma
  - ______________________ : Secondary injury caused by factors resulting from the primary injury (swelling, increased ICP)

34 Direct Brain Injury Types

1. ______________________ : Injury at site of impact

35 Direct Brain Injury Categories
Focal Injury:
- Occur at a _____________ location in brain
  - Cerebral ________________
  - Intracranial Hemorrhage
  - Intracerebral Hemorrhage

Diffuse Injury:
- ________________ injury to other locations
  - Concussion

36 □ Focal Brain Injuries

37 □ Cerebral Contusion
- ________________ trauma to local brain tissue
- Capillary bleeding into brain tissue
- Common with blunt head trauma
- Characterized by:
  - ________________
  - Neurologic deficits
  - Personality changes
  - Vision changes
  - ________________ changes
- Results from coup-contrecoup injury

38 □ Intracranial Hemorrhage: Epidural Hematoma
- Bleeding between dura mater and skull
- Involves arteries
  - Middle ________________ artery most common
- Rapid bleeding & reduction of ________________ to tissues
- Herniates brain toward foramen magnum
  - Hole in the base of the skull where the ________________ enters and exits the skull vault

39 □ Epidural Hematoma

40 □ Intracranial Hemorrhage: Subdural Hematoma
- Bleeding within ________________
  - Beneath dura mater & within subarachnoid space
  - Above ________________ mater
- Slow bleeding
- Signs progress over several days
- Slow deterioration of ________________ status

41 □ Subdural Hematoma

42 □ Intracerebral Hemorrhage
- ________________ blood vessel within the brain
- Presentation similar to stroke symptoms
- Signs and symptoms ________________ over time
Diffuse Brain Injuries

Diffuse Brain Injury
- Due to forces placed on axons
- Pathology distributed throughout brain
- 3 Types
  - Moderate Diffuse Axonal Injury
  - Severe Diffuse Axonal Injury

Concussion
- Mild to moderate form of Diffuse Axonal Injury
- Nerve dysfunction anatomic damage
- Episodes of confusion, disorientation, event amnesia
- Suspect if patient has a momentary loss of consciousness
- Management:
  - Frequent reassessment of (LOC)
  - ABC’s

Moderate Diffuse Axonal Injury
- “Classic Concussion”
- Same mechanism as concussion
- May exist with a basilar skull fracture
- Signs & Symptoms:
  - Unconsciousness or persistent anatomic damage
  - Loss of concentration, disorientation
  - Retrograde and/or antegrade episodes of confusion, disorientation, event amnesia
  - Visual and sensory disturbances
  - Mood or personality changes

Severe Diffuse Axonal Injury
- Significant mechanical disruption of axons to hemispheres and to brainstem
- High mortality rate
- Signs & Symptoms:
  - Prolonged unconsciousness
  - Signs of (Cushing’s reflex)
    - Increased BP, slowing pulse, slowing respirations
  - Decorticate or Decerebrate

Posturing
- Decorticate Posturing:
  - Indicates injury of brainstem
  - Arms , fists clinched, and legs
Decerebrate Posturing:
- Indicates injury elsewhere in brainstem
- Stiff and __________________________ extremities and __________________________ (extended) head

49 Intracranial Perfusion (1 of 4)
Cranial volume fixed:
- 80% = Cerebrum, cerebellum & brainstem
- 12% = Blood vessels & __________________________
- 8% = __________________________
- Increase in size of one component diminishes size of another
- Inability to adjust = __________________________ ICP

50 Intracranial Perfusion (2 of 4)
Compensating Mechanisms for Pressure:
1) Compress (constrict) __________________________ blood vessels
2) Reduction in free __________________________
   - Pushed into spinal cord
- Body can only compensate for a __________________________ amount of time

51 Intracranial Perfusion (3 of 4)
Decompensating for Pressure:
- __________________________ in ICP
- __________________________ in systemic BP to perfuse brain which causes in increase in ICP
- Dangerous cycle begins

52 Intracranial Perfusion (4 of 4)

53 Roles of Carbon Dioxide
Increase of CO2 in CSF:
- Cerebral __________________________
  - Encourage blood flow
  - Reduce __________________________
  - Contributes to ↑ ICP
- Causes __________________________ & Hypertension

Reduced levels of CO2 in CSF:
- Cerebral vasoconstriction
  - Results in cerebral __________________________

54 Factors Affecting ICP
- Vasculature __________________________
- Cerebral Edema
- Systolic Blood Pressure
- Low BP = Poor ________________________________ Perfusion
- High BP = Increased ____________________________
  ● Carbon Dioxide
  ● Reduced respiratory efficiency

55 Pathway of Deterioration

56 S/S of Brain Injury (1 of 2)
  ● Altered Mental Status
    - Altered ________________________________
    - Alteration in personality
    - Amnesia
      ● Retrograde: just ____________________________ incident
      ● Antegrade: just ____________________________ incident
  ● Cushing’s Reflex
    - ________________________________ BP
    - Bradycardia
    - Erratic ________________________________

57 S/S of Brain Injury (2 of 2)
  ● Vomiting:
    - Normally without ________________________________
    - May be projectile
  ● Body ________________________________ changes
  ● Changes in ________________________________ reactivity
  ● Decorticate posturing
  ● Decerebrate Posturing

58 Signs & Symptoms of Brain Injury Physiological Changes (1 of 2)
  Middle Brainstem Compression:
  ● Widening ________________________________ pressure
  ● Increasing ________________________________
  ● CNS Hyperventilation
    - Deep and Rapid
  ● Bilateral ________________________________ sluggishness or inactivity
  ● Decerebrate posturing

59 Signs & Symptoms of Brain Injury Physiological Changes (2 of 2)
  Lower brainstem injury:
  ● Pupils ________________________________ and unreactive
  ● Ataxic respirations
    - Erratic with no pattern
  ● Irregular and erratic ________________________________ rate
  ● ECG changes
  ● Hypotension
  ● Loss of response to ________________________________ stimuli
60 Recognition of Cerebral Herniation
- Increasing blood pressure
- Decreasing pulse rate
- Respirations that become erratic
- Lowering level of consciousness
  - GCS <__________ and dropping
- Singular or bilaterally dilated and fixed pupils
- Decerebrate or decorticate __________________________
- No movement with stimuli

61 Signs & Symptoms of Brain Injury Pediatric Head Trauma
- Different pathology than older patients
- Skull can distort due to anterior and posterior fontanelles
  - __________________________
  - Slows __________________________ of increasing ICP
- Intracranial hemorrhage contributes to hypovolemia
General Management:
- Avoid __________________________ of head
- Ventilate through mouth and nose

62 Facial Injuries

63 Facial Soft Tissue Injury
- Highly vascular tissue
  - Contribute to __________________________
- Superficial injuries rarely life threatening and rarely involve the airway
- Deep Injuries can result in blood being swallowed and endanger the
  __________________________
- Soft tissue swelling reduces airflow
- Consider likelihood of basilar skull fracture or __________________________ injury

64 Facial Dislocations and Fractures (1 of 2)
Mandibular Fracture:
- Deformity along jaw & loss of __________________________
- Possible airway compromise if patient placed
  __________________________
- Evaluate for multiple fracture sites
Maxillary & Nasal Fracture
- Main concern is with __________________________ compromise

65 Facial Dislocations and Fractures (2 of 2)
Orbit (__________________________ Fractures)
- Involve Zygoma or Maxilla
- Reduction of eye movement
Nasal Injury

- Rarely life threatening
- Swelling & Hemorrhage interfere with ____________ movement
- ____________ is the most common problem
- Avoid ____________ intubation and NG tubes
  - Passage into the cerebral cavity

Ear Injury

External Ear:
- Poor blood supply and poor ____________
- Bandage on ____________ sides of ear

Internal Ear:
- Well protected from trauma
- May be injured due to rapid pressure changes
  - ____________, blast, or explosions
  - Temporary or permanent ____________ loss

Eye Injury (1 of 3)

Penetrating trauma:
- Can result in long term ____________
- Suspect small foreign body if patient complains of sudden eye pain and sensation of something on the eye
- DO NOT REMOVE ANY ____________ OBJECT
- Bandage ____________

Corneal Abrasions & Lacerations:
- Common & usually superficial

Penetrating Eye Injury

Eye Injury (2 of 3)

Hyphema:
- Blunt trauma to the ____________ chamber of the eye
- Blood in front of iris or ____________

Sub-conjunctival Hemorrhage:
- Less serious condition
- May occur after strong ____________, severe vomiting or direct trauma

Hyphema

Eye Injury (3 of 3)

Acute Retinal Artery Occlusion:
- Non- ____________ origin
- Painless loss of vision in ____________ eye
- Occlusion of retinal artery
Retinal Detachment:
- Traumatic origin
- Complaint of dark obstruction in the field of view
- Possibly painful depending on type of trauma

73 Neck Injury (1 of 3)
Blunt trauma can cause serious Neck Laceration:
- Serious bleeding
- Entraining of air
  - Cover with occlusive dressing
Airway Trauma:
- Tracheal rupture or dissection from larynx
- Airway & compromise

74 Neck Injury (2 of 3)
Cervical Spine Trauma:
- Vertebral fracture
  - Anesthesia, paresis (partial loss of movement or impaired movement), or paralysis beneath the level of the injury
  - Shock may occur
Other Neck Trauma:
- Subcutaneous emphysema
- Tension pneumothorax
- Traumatic

75 Neck Injury (3 of 3)
Penetrating Trauma:
- Esophagus or Trachea
  - Nerve disruption
  - Tachycardia & GI disturbances
- Thyroid & Parathyroid glands
  - Highly

76 Assessment of Head, Facial & Neck Injuries
- Scene Size-up
- Assessment (ABC’s)
- Rapid Trauma Assessment
  - Head, face, neck
- Focused History & Physical Exam
  - Signs
- Detailed Assessment
  - Assessment

77 Management (1 of 3)
Airway:
- Suctioning
- Patient positioning: Head elevated
- OPA & NPA Use
  - Use caution with ________________ on head/facial/nasal injuries
- Endotracheal Intubation
  - ________________, Digital, Nasotracheal, RSI

Management (2 of 3)
Breathing:
- Oxygen: NRB @ 15lpm
- Ventilate @ 12-20 bpm
  - Do NOT ________________
Circulation:
- ________________ control
- Fluid resuscitation if ________________

Management (3 of 3)
Hypovolemia Management
- Reduces cerebral perfusion & hypoxia
- Consider early management with 2 large bore IV’s and isotonic fluids
  - _____________ cc/kg to maintain SBP _____________ - _____________ mmHg

Management of a Closed Head Injury
- Manage airway and breathing
  - Do NOT ________________
  - Administer high concentration of oxygen
- Control bleeding NOT ________________
- Elevate ________________ if possible
- Limit IV fluids if closed head injury
  - Excessive fluids can increase ________________
  - Run at TKO rate unless hypovolemic from other injuries

Medications: Oxygen
- Primary 1st line drug
- Administer high flow
- Hyperventilation is contraindicated
  - Reduces circulating ________________ levels
- NRB: 15 LPM
- BVM: _____________ - _____________ times per minute
- Keep SaO2 > _____________ %

Other Medications (1 of 3)
Diuretics
- Used to reduce ________________
Examples
- Mannitol
- Lasix (Furosemide)

Corticosteroids
- To reduce __________
- Solu-Medrol, Decadron

Other Medications (2 of 3)
Paralytics:
- Used to achieve __________
- Pt becomes paralyzed and ceases __________
- Examples
  - Succinylcholine (Anectine)
  - Pancuronium (Pavulon)
  - Vecuronium (Norcuron)
  - Mivicron (Mivicronium)

Other Medications (3 of 3)
Sedatives:
- Used for __________
- Examples:
  - Diazepam (Valium)
  - Lorazepam (__________)
  - Midazolam (Versed)
  - __________

Other Possible Medications
- Atropine: decreases oral and nasal __________
- __________: if hypoglycemic
- Thiamine (B1 vitamin): for ETOH
- Topical Anesthetic Sprays
  - Reduces __________ Reflex
  - Xylocaine or Benzocaine

Emotional Support
- Have friend or family provide constant reassurance
- Provided constant __________ to environment if required
  - Keeps patient __________
  - Reduces __________

Scalp Injury Care
- Cover the open wound with __________ dressing
- Apply direct pressure
  - Avoid pressure over known __________ fracture
- Pad under the fold of the scalp
• ______________________________ with NS to remove gross contamination

88 □ Eye Injury Care
General Eye Injury:
• Cover injured and uninjured eye
  – Prevents ______________________________ motion
  – Consider sterile dressing soaked in NS
Corneal Abrasion:
• Invert eyelid and examine eye for foreign body
• Remove with NS moistened ______________________________
Avulsed or Impaled Object in Eye:
• Cover and Protect from ______________________________

89 □ Special Injury Care
Dislodged Teeth:
• Rinse in ______________________________
• Wrap in NS soaked gauze
Impaled Objects:
• Secure with bulky dressing
• ______________________________ object to prevent movement
• ______________________________ pressure around wound

90 □ Key Points (1 of 2)
• Consider ______________________________ immobilization!!
• Airway management is ______________________________ a priority
• A closed head injury alone cannot produce hypovolemic shock in an adult patient.
• If S/S of hypovolemic shock exists on a patient with a closed head injury, LOOK ______________________________ !

91 □ Key Points (2 of 2)
• Limit ______________________________ resuscitation on patients with a closed head injury unless S/S of hypovolemia are present
• Head and facial injuries can be very gruesome. Don’t get tunnel vision and overlook injuries ______________________________